Assignment 2
Probability and Random Processes

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Question 1.3.2
Find equation of AD_1.
Solution:
From question 1.3.1, normal vector of AD_1 is

$$\mathbf{n} = \mathbf{C} - \mathbf{B} = \begin{pmatrix} 1 \\ -11 \end{pmatrix}$$

Vector equation of a line passing through $\mathbf{A}$ & normal to $\mathbf{n}$ is

$$\mathbf{n}^\top (\mathbf{x} - \mathbf{A}) = 0 \tag{1}$$

$$\begin{pmatrix} 1 & -11 \end{pmatrix} \left(\mathbf{x} - \begin{pmatrix} 1 \\ -1 \end{pmatrix} \right) = 0 \tag{2}$$

$$\begin{pmatrix} 1 & -11 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 1 & -11 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix} \tag{3}$$

$$\begin{pmatrix} 1 & -11 \end{pmatrix} \mathbf{x} = 12 \tag{4}$$

$\therefore$ The vector equation of AD_1 is

$$\begin{pmatrix} 1 & -11 \end{pmatrix} \mathbf{x} = 12$$

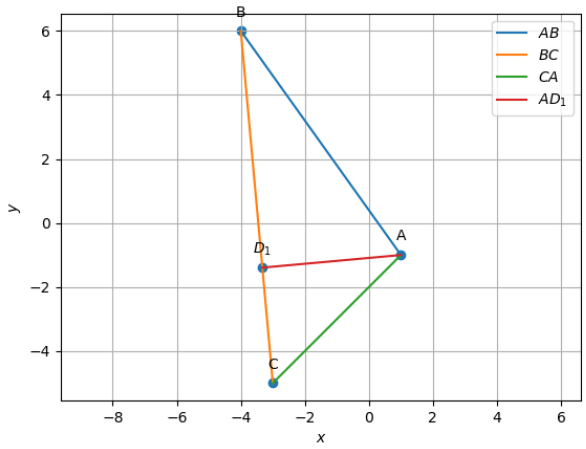

Fig. 0. $\mathbf{D_1}$ is foot of perpendicular of $\mathbf{A}$ onto BC